

AMERICAN

DECEMBER • 1956

Cinematographer

THE JOURNAL OF MOTION PICTURE PHOTOGRAPHY



This Issue ...

- Shooting Night Scenes in Daylight
- Multiple Camera Control in TV Filming
- Filming "12 Angry Men" on a Single Set

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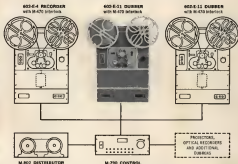
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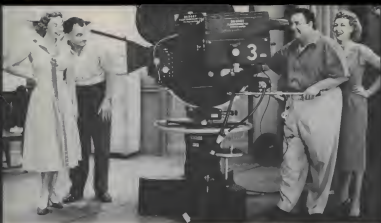
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JACKIE GLEASON'S "HONEYMOONERS" is filmed by Du Mont Electronicam System which incorporates an specially designed and adopted 35mm Mitchell movie camera. Here are Jackie Gleason and Julie London, right, peering through the camera lens of Art Carney.

NEW ELECTRONICAM REDUCES SHOOTING TIME

Du Mont's Video-Film System incorporates both Mitchell 35mm film camera and TV camera

First to use a video-film system in major TV film production is Jackie Gleason's popular show "The Honeymooners." In going "live on film" Jackie Gleason makes use of the new Du Mont Electronicam System, which combines advanced TV techniques with highest quality 35mm photography.

Heart of the Electronicam System is a completely new type of unit, blending a Du Mont TV camera and a specially adapted Mitchell 35mm camera using a common lens system. It gives the producer full advantage of the best techniques of motion picture production while enjoying the time saving and broadened creative scope available in video's electronic practices. Savings in shooting time and costs are substantial.

The 35mm Mitchell cameras used as integral parts of the Electronicam System produce consistently superior black and white films, as well as color films which are unequalled for uniformity of quality. Mitchell cameras today serve not only in the television industry, but also are the predominant choice in the production of governmental, industrial, research and educational films, as well as being standard equipment for major studios throughout the world.

Complete information on Mitchell cameras is available upon request on your letterhead.

***85% of professional motion pictures shown in theatres throughout the world are filmed with a Mitchell**



Du Mont Electronicam pick-up, Mitchell 35mm film camera on left, TV camera on right



Scene from "The Honeymooners" shows Jackie Gleason and Art Carney on set before three pickup units of Electronicam System. Each pickup unit has both TV camera and specially designed Mitchell film camera.

Mitchell Camera
CORPORATION

686 WEST HAVARD STREET
GLENDALE 4 CALIFORNIA

Cable Address: "MIFCAMO"

AMERICAN Cinematographer

THE MAGAZINE OF MOTION PICTURE PHOTOGRAPHY
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ON THE COVER

DIRECTOR H. C. Potter (center, back to camera) explains the action of a scene to Paul Stewart and Susan Hayward, as Director of Photography Stanley Cortez, A.S.C. (left) and his camera crew prepare to shoot the scene for "Mervyn Gordon, U.S.A.," a Warner Brothers production.—Photo by Floyd McCarty.

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TRI-CISCO SMALL GYRO TRIPOD features "balanced action". Not too speedy—clears of fast—for both pointing and tilting. Especially recommended for 16mm Mitchell, 16mm Minox, B&H Spina and similar cameras. Weight, 17 lb. Precision construction, also used as gear head. Crank handles included.

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15-19	15
20-24	20
25-29	25

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⁴Space party and numbers available.

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Reeves Soundcraft Corp., 10 East 52nd St., New York 22, N. Y., announces Two-track Magna-Stripe which enables film producers to use one magnetic film for original recording and also for editing. The new magnetic sound film has a clear edge for marking or coding, and a clear center enabling the editor to see through to the picture. A colored balancing stripe on one side of the film provides for easy identification of A or B track, even while the camera is in operation.

Eastman Kodak Company, Rochester, New York, announces its new Brownie Two-Lamp Movie Light for use with cine cameras in making indoor movies.

A companion unit, having provisions for four photo lamps, is also offered and makes it possible to shoot color movies indoors up to 18 feet from subject at a lens stop of $f/1.9$. The four-lamp bar folds for easy storage and has two switches controlling two or four lights as desired.

"Superior" 4 panchromatic motion picture negative film, type 928, rated at 320 daylight and 250 tungsten, is now available in both 16mm and 35mm widths, it has been announced by DuPont Photo Products Department, Wilmington, Delaware.

The new Agalux stock has a fine-grain, wide-latitude emulsion which permits high quality results under a wide variety of outdoor or indoor lighting conditions — particularly under "existing" light.

The new film is said to be ideally suited to television film production because of its long time scale.

Western Cine Service, 144 East 8th Avenue, Denver, Colorado, has added Anisochrome processing to its established black-and-white lab service. With a new color machine and 1500 square feet of new space, company now has facilities for offering every laboratory service for both professional and amateur users of motion picture film, both color and black-and-white.

Latest information on a wide variety
(Continued on Page 748)

NEW



AUTOMATIC FILM SPLICER

... splice any type film with no frame loss



The HFC automatic film splicer uses a special transparent tape, perforated to match the film to be spliced and coated on one side with a pressure adhesive. The tape is pressed and rolled onto the film as required. The unit makes butt or overlap splices. The tape is rolled onto the film automatically from a precision sprocket. Registration pins ensure perfect lineup of film. Stock units are for 35mm positive film.



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AFS-35—(35mm MODEL)
AFS-16—(16mm MODEL)
\$175 F.O.B. HOLLYWOOD



FILM-EDGE NUMBERING MACHINE

(Coding Machine)

An important aid and time saving device which enables the Film Editor to quickly tie together the picture and sound track in perfect synchronization is the HFC film edge numbering or coding machine. The machine numbers every 16 frames in 35mm, the 16mm model numbers every 40 frames. The numbering block consists of two letter wheels or one number and one letter wheel manually operated and four number wheels which move automatically and number the film from 0001 to 9999. All numbers can be reset by hand to begin at any number.

ENM-35—(35mm MODEL)
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— not a beam splitting device — passes 100% of the light to film and viewing system intermittently.

FINDER SHOWS BRIGHT IMAGE THROUGH TAKING LENS

— even in poor light. 10X magnification; no parallax; no misframing; accurate, easy follow-focus.

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— with balanced rear pressure pad, side pressure rail, cross stages around aperture. This means rock-steady pictures, no film "breathing," 35mm-like film quality.

THREE LENS DIVERGENT TURRET

— lets you use wide angle lens to 300mm telephoto without physical or optical interference.

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— with large-flange surface insures positive seating and precise flange focus and alignment.

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VARIABLE SPEED MOTOR

— electrically driven by light, compact, rechargeable batteries. Motor instantly interchangeable for other types — Governor Controlled, Synchronous and Animation.

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HAND-HELD FILMING

— all these features in a camera so light (only 6½ lbs), so formfitting, with its ingenious Contour Hand Grip, that steady, hand-held filming is easy.

Because of its versatility

It is a hand camera for newsreel and fast action filming.

It is a studio camera when you add the 400' Magazine and the Synchronous Motor.

It is a sound camera when you put it in the Arriflex Blimp.

It is also an animation camera, a scientific laboratory camera, a medical camera, a cine-micrographic camera.

You can start with the hand camera, and as your requirements demand, add the special purpose accessories, and yet be able to convert it back to a hand camera in a few seconds — and without the use of even a screwdriver.

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Here is a precision camera that can "take a beating" and still deliver the goods.

For instance: Al Milotte, ace Disney wild-life photographer, shot over 90,000 feet for "African Lion" with one Arriflex 16, in the rough tropics.

Disney cameramen found the Arriflex 16 most reliable during the Navy North Pole Expedition in 1954.

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WHAT'S NEW

(Continued From Page 705)

of special lenses, prisms, reflectors, etc., for industrial use is offered by Bausch & Lomb Optical Co., 635 St. Paul Street, Rochester, N. Y., in a 16-page catalog of optical parts.

Catalog also contains information on ground glass, heat absorption glass, retardative plates, and the Bausch & Lomb precision glass engraving and optical coating services. Included also is price list detailing discount procedure, minimum ordering quantities, and terms of sale.

Copies are available free by writing the company direct.

Anti-static Film Cleaner

"Dust-Clean" is name of new chemical film cleaner which contains no carbon tetrachloride and is non-inflammable. Product removes dust, dirt, grease-pencil marks, cue marks, masking tape residue, etc., also static electricity from all photographic film.

List price is \$10.00 per gallon. Manufacturer is Nicholas Prods. Co., 3403A Cahuenga Blvd., Los Angeles 28, Calif.

Rental Service

Serving mid-west motion picture and TV film producers is Victor Duncan, 4028 Oleatha, St. Louis 16, Missouri. Motion picture cameras available include Mitchell 35mm NC, Mitchell Brena, Eyemoor, Filmo, and Auricon; also Blinks, lenses, motors, and tripods. No grip or lighting equipment is available. All equipment is late model. Price list available on request.

Camera Data

A new series of information sheets relating to their various models of instrumentation cameras, data cameras and accessories is available from Condor Enterprises, 5502 No. Cahuenga Blvd., North Hollywood, Calif. Included is information regarding the company's Thum Photoconic high-speed camera, strip camera, roll and cut film driers, film developers, printers, enlargers, and miscellaneous laboratory equipment.

Coated Optics Service

Pasero Mirrors, Inc., 2958 Los Feliz Blvd., Los Angeles 39, Calif., has installed larger and more efficient pumping systems for the company's steel vacuum chambers employed in coating photo lenses, mirrors, etc.

Company specializes in durable, high-reflecting front-surface mirrors as well as many types of beam-splitters, reflecting ultra-violet and infrared films; also the dielectric coatings and neutral density graduate filters.

Auricon
Hollywood



"Auricon Pro-600"
with Single Lens "C" Mount,
Critical-Finder Objective, plus
Standard Auricon Finders.

"Auricon Pro-600"
with Critical Ground-Glass Focusing,
available on 3-Lens Turret Model.



Preferred by PROFESSIONALS... THE ALL NEW 'AURICON PRO-600' for 16mm optical sound-on-film

Self-blinded for completely quiet studio operation. The whisper-quiet film flow of The "Auricon Pro-600" is silent proof of precision design. Your sound-recording microphones never picks up "Pro-600" Camera noise!

600 ft. film Magazines with Auricon-Electromechanic Take-up, for 16 minutes of continuous "Talking-Picture" filming.

Synchronous Motor Drive for "Single-System" or "Double-System" Recording.

\$1,497.00 let... for Auricon Pro-600 "Double-System" professional picture-camera with built-in features. Also available at added cost is "Single-System" equipment for Optical Sound-Track-On-Film, "C-mount" Lenses, View-Finders, Film Magazines, 3-Lens Turret, Critical Ground-Glass Focusing, Lens Sun-Shades, Tele-Finders, etc...

Sold with 30 day money-back guarantee, you must be satisfied!

Write for free illustrated "Auricon Pro-600" literature and price schedule.

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"Auricon Pro-600"
features Push-Button "On-Off,"
with safety-interlocked
film-flow mechanism



"Auricon Pro-600"
Turret Model with
"Zoom" type Lens
and Finder in use.

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RECORDING EQUIPMENT SINCE 1931



Camera
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Microphone
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Camera
Modeling



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Modeling



Microphone
Modeling

HOLLYWOOD BULLETIN BOARD

News briefs about the A.S.C.

its members, and important

industry personalities



American Society of Cinematographers celebrated the opening of its recently refurbished clubhouse in Hollywood December 1, holding Open House for members and guests. Pictured are some of guests enjoying refreshments in the photo room.



Left to right are Mrs. Joseph Bulfinch, Mrs. Walter Wilson, Mrs. John Arnold, John Arnold, and Joseph Bulfinch. Being greeted by Bulfinch's wife Mrs. Arthur Wilson in next photo are Mr. and Mrs. Arthur Arling.



Receiving guests at the A.S.C. Open House are A.S.C. president Arthur Wilson, Mr. and Mrs. Eddie Fitzgerald and Mr. and Mrs. John Shaw. In center photo.



Mr. Taylor poses with his attractive wife. Right: A.S.C. president George Folsey (left) chats with visitors Mr. and Mrs. Vaughan Harbo.



At special banquet last month when A.S.C. members were hosted by Consolidated Film Laboratories, Hollywood, George Folsey (left), president of A.S.C., presented cameraman Hal Rosson with Gold Membership card, commemorating 25 years membership in the society. George Folsey, Edward G. Robinson, V-Pose at



Win J. Brown, Inc., greeted A.S.C. members in local address. At Mr. Folsey's left is G.P.P. Ed Brown at his right, George Folsey. Right: Photo Edgar Rosson also posed Charlie McCarthy, advanced the program recording his experience as a photographer.



Season's Greetings

To Our Friends The World Over



NEW CAMART DUAL SOUND READER

- Dual single and double system Stereo or Mono optical sound
- Dual single system Magnetiscope or double system magnetic sound
- Use with any Stereo motion picture viewer to obtain perfect lip-synch matching of picture to track
- Works from left to right or right to left
- Magnetiscope Model \$185.00
- Optical Model \$195.00



WIDE-SCREEN SUPERAMA-16 LENS

A dash purpose anamorphic lens designed for both the taking and projection of Regular format motion pictures. Aspect ratio of 2.40 to 1.6 for extra wide pictures

Superama-16 for silent projectors \$159.50

Superama-16 for sound projectors, specify make of projector \$169.50

CAMART BABY DOLLY

Only a four-wheel dolly will provide the balance and stability required for professional production. Adjustable seat for convenient platform arrangement. Available

\$375.00

Dolly tracks available



A. C. E. ROTARY VIEWER

Permits viewing of film between slides or backwards — at, reversed angle. The A. C. E. Film Viewer is especially designed to facilitate viewing original negative film without developing. A. C. E. ROTARY VIEWER \$159.50

Footage and frame counter optional \$64.90

Image Director \$28.50



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TECHNICAL QUESTIONS & ANSWERS

Conducted by Walter Sirengo, A.S.C.



Q Questions relating to cinematography or other phases of film production are invited from readers and will be answered by letter by Walter Sirengo or by other qualified members of the American Society of Cinematographers. Questions and answers considered of general interest will appear in this column.—Ed.

Q What is the procedure for producing artificial cloud effects, such as used in a heavenly scene of a recent Hollywood production. The clouds were maintained at low level, moving around the feet of the actors.—M. B. Tchern, Iran.

The production of special clouds, fog, and low-hanging mist effects in motion pictures is the work of a highly specialized group of men, and such effects are rather ambitious to be undertaken by the uninitiated, as they require a great deal of equipment to produce.

Containers, usually shallow pans, filled with oil are heated to produce smoke which is blown through tubes about six inches in diameter to the set. At the end of each tube is a box containing dry ice which lowers temperature of the smoke causing it to flow close to the floor. Dumping the floor with water further aids in keeping the smoke at low level.

Some success may be had in small, confined areas by covering a piece of dry ice with a damp grass mat or heavy cloth such as burlap, and gently blowing the mist over the set with a fan.

Such effects are best produced on a set or in an enclosure free of drafts so that the consistency and direction of the smoke can be controlled by electric fans.

Sounds complicated? It is.—Arthur Miller, A.S.C.

Q For a fifteen black-and-white film I am making, I want to have white under superimposed at the head over a live-action background. The film is being shot on negative.

If, in preparing my A and B rolls for print, the titles are black on white (as they would be in the negative stage), the white portion would print through so that the background on the other roll would not appear.

What alternatives are there for producing the white title text superimposed? —A. F., New York, N. Y.

It is possible to attain a white letter superimposed on a background through the process of negative-positive printing. It is necessary, however, to superimpose the title and print the background in one pass through the printing machine. This method is commonly used to superimpose English titles on foreign pictures.

Inasmuch as this operation is more costly than for a normal print, the use of a dupes negative is suggested, with the superimposition incorporated into one record of film for final release use. By using the first method the problems of title movement, proper synchronization of title over background, and of picking up dirt and dust particles on the additional record of the film, makes a clumsy and hazardous operation. However, it can be done.—Ted Fogelman, Associate Member, A.S.C.

Q I am undertaking the compilation of a list of the perforation systems used for motion picture films. This will include the data on such systems as Fox-Grandeur, Military Standard, Bell & Howell, etc. Any data that you are able to supply will be appreciated.—M. B. Rubenack, Calif.

Such information as you require we believe is available from the Society of Motion Picture and Television Engineers, 55 West 42nd Street, New York 36, N. Y., or the American Standards Association, 70 East 45th St., New York 17, N. Y.—Emory Ruse, Technical Editor, American Cinematographer.

Q When using a combination of filters for a night effect, such as the 23A with a 56B, are the factors of both filters added or multiplied for the resultant to be used?—B. D., New York, N. Y.

It is assumed that by the expression, "resultant to be used," you mean the final exposure arrived at using the filter combination described.

Yes, with few exceptions, always multiply the two factors. In this case, using Eastman or DuPont pan-bromide film, the factor of 4 (for the 23A) and of 5 for the 56B) gives a factor of 20.

Incidentally, the filter combination mentioned is considered one of the best. It is the nearest approach to what we call "spectral neutrality." —Edmund Fredricks, A.S.C.

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Photographic Assignments

NOVEMBER • 1956

Who, where and what the industry's cameramen were shooting last month

*Asterisks indicate television film productions

ALLIED ARTISTS

• WILLIAM MILLER, ASC, "Love in the Afternoon," (shooting in Paris) with Gary Cooper, Audrey Hepburn and Maurice Chevalier. Billy Wilder, producer-director.

• FLORE CHERRY, ASC, "Attack of the Crab Monsters," (Roger Corman Prod.) with Rick and Garland and Pamela Duncan. Roger Corman, producer-director.

AMERICAN-INTERNATIONAL

• FRED WALT, ASC, "Voodoo Women," (Carol Prude) with Marie English and Tim Corbin. Edward Cahn, director.

AMERICAN NATIONAL

• HAROLD WILLIAMS, ASC, "Adventures of Superman," (Superman Inc.) with George Reeves, Noel Neill, Jack Larson. Various directors.

• BOB BROTHERS, "Dr. Christian," (Ziv-TV) with MacDonald Carey, Paul Gillette, director. "Men of Antelope," (Ziv-TV). Various directors. "West Point," (Ziv-TV). Norman Foster, director. "Highway Patrol," (Ziv-TV) with Randolph Croftford. Herb Strick, director.

• LEO FATHIN, "Highway Patrol," (Ziv-TV) with Randolph Croftford. Eddie Bern, director.

• WILLIAM ANDERSON, "West Point," (Ziv-TV). James Sheldon, director. "Dr. Christian," (Ziv-TV) with MacDonald Carey. Herb Strick, director. "Highway Patrol," (Ziv-TV) with Randolph Croftford. Herb Strick, director.

BALTIMORE STUDIOS (New York)

• J. BONE CANTON, ASC, "Street of Shadows," (Security Pictures for UA release) with George Montgomery and Geraldine Brooks. William Brooks, producer-director.

CALIFORNIA STUDIOS

• HAL McCLURE, "O. Henry Playhouse," (Gross-Kremer, Inc.) with Thomas Mitchell, Peter Goffrey and Burt Reynolds. Director: "Dr. Harbo's Secret Journal," (Weiss, Inc.) with John Howard. Peter Goffrey, director.

• LUCYEN ANDREOT, ASC, "The Life of Riley," with William Brooks. Alby Berlin, director.

• LESTER SCOTT, ASC, "Adventures of Hyman Hershkovitz," (Gross-Kremer) with Wally Cox. Philip Rapp, director. "Mystery Theatre," (Gross-Kremer Inc.). Albert McCarty, director.

• FRED GINSLEY, ASC, "The Broadway Comedy Show," (Magill Corp.) with Ramsey Clemons. Dick Butler, director.

CATHART SOUND IMAGE

• WILLIAM WHITELY, ASC, "The Last

Reaper," with Clayton Moore and J. Silverstein. Earl Elamy, director.

COLUMBIA

• TAO MOUNT, "Interpol," (Technicolor). Warwick French shooting in Rome) with Victor Mature and Anna Ekberg. John Gilling, director.

• BOB KRAMER, "The Story of Esther Costello," (Valiant Film, Ltd. shooting in London) with Joan Crawford and Rosanna Brown. David Miller, director.

• KIM CARRON, "Father Knows Best," (Screen Gems) with Robert Young and Jane Wyatt. Peter Tewksbury, director.

• JACK HILTON, "The Bridge on the River Kwai," (Haram-American Prods. shooting in Ceylon) with Jack Hawkins and Alec Guinness. David Lean, director.

• EMMETT HALLER, ASC, "The Company and the Heiress," (shooting in Georgia) with Sal Mineo and James Whitmore. Allied Worker, director.

• WILLIAM COOPER, "The Admirable Creation," (London Film shooting in Bermuda) with Kenneth More and Diana Clavin. Lewis Gilbert, director.

• GAROLD GERS, "Fortune is a Woman," (Laurie-Gilbert Prod. shooting in London) with Jack Hawkins and Ariane Dahl. Sidney Gilliat, director.

• RALPH ENGLISH, "Seven on Trial," (Merrim Film, shooting in London) with John Mills, Charles Collier and Barbara Bates. John Gullerman, director.

• JOSEPH RABIN, ASC, "Garment Center," with Lee J. Cobb and Kenneth Matthews. Robert Aldrich, director.

• HAL MOORE, ASC, "George Sanders Mystery Theatre," (Screen Gems), Fletcher Markle, director.

• BENJAMIN KLING, ASC, "Zombies of Marat-Tai," with Allison Hayes and George Palmer. Edward L. Cahn, director.

• IRVING LIPPMAN, "Twenty Million Miles to Earth," (Nemaguide Prod.) with William Hopper and Jane Taylor. Nathan J. Janin, director. "The Night the World Exploded," with Wm. Locke and Kathryn Grant. Fred Sears, director. "Run Tin Tin," with Lee Aaker and James Brown. Lee London, director.

• BEVY FRIEDMAN, ASC, "The Young Rebels," with Peter Vinkler and Dorothy Green. David Rich, director.

• TED SCOTT, "The Bewitched," (shooting in London) with Dana Andrews. Jacques Tourneur, director.

• BOB KRAMER, "The Golden Virgin," (Valiant Film shooting in London) with Joan Crawford and Rosanna Brown. David Miller, director.

(Continued on Page 720)

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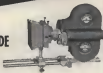
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PHOTOGRAPHIC ASSIGNMENTS

(Continued From Page 70)

• BENNETT GUYER, ASC, "The Brothers Back" (Warner Bros. Prod.) with Richard Conte and Susan Foster. Phil Karlson, director. "Ford Theatre" (Screen Gems). Various directors.

• RAY COY, ASC, "Fin Tin Tin" (Screen Gems) with Lee Acker and James Brown. Lee Acker, director.

• GERT ANDERSEN, ASC, "Playhouse 90" (Screen Gems). John Braham, director.

• FRED JACKMAN, Jr., "Circus Boy" (Screen Gems) with Mickey Rudick and South Perry. George Archainault, director. "77th Annual Awards" (Screen Gems) with Phil Arny. George Archainault, director.

• CHARLES LANTON, ASC, "Ford Theatre" (Screen Gems). Various directors.

RUMFART STUDIOS

• VINCE MILLER, ASC, "You Bet Your Life" (Fibersilk Prods.) with Groucho Marx. Robert O'Neil, director.

FLYING "A" PRODUCTIONS

• WILLIAM BRADFORD, ASC, "Annie Oakley" with Gail Davis, Jimmy Hawkins and Brad Johnson. Ray Nazario & Russ Lederman, directors.

POK WESTERN AVENUE STUDIOS

• LLOYD ARDEN, ASC, "T. C. F. Hunt" (Various directors).

• CHARLES VAN ENCK, ASC, "Broken Arrow" with John Lupton. Various directors. "Silverwest Pictures commercial". Dennis Allen, director.

• GORDON APT, ASC, "Kaiser Aluminum Commercial". Dennis Allen, director.

GENERAL SERVICE

• JAMES VAN TREK, ASC, "Barnes & Allen Show" (McClellan Prods.) with George Allen and George Barnes. Rod Amstutz, director. "Carleton & B. F. Goodrich commercials". Rod Amstutz, director.

• HARRY WILK, ASC, "Ed Cummings Show" (Lewy Prods.) with Bob Cummings and Rosemary DeCamp. Norman Toker, director.

• PHILIP TANNING, ASC, "The People's Choice" (Norden Prods.) with Jackie Cooper and Pat Fraley. Jackie Cooper, director.

• NEAL BACKMAN, "The Adventures of Ozzie and Harriet" (Stage 5 Prods.) with Ozzie, Harriet, David, and Ricky Nelson. Ozzie Nelson, director.

• FRANK PHILLIPS, "Navy Log" (Gallo Prods. Inc.). Oscar Rudolph.

GOLDWYN STUDIOS

• NORMAN EMMETT, ASC, "The Lowest Young Show" (Lewy Prods.) with Lewy. Lewy, director.

• EDWARD FIVECRAIG, ASC, "Crematorium" (Patent TV Inc.). Various directors.

(Continued on Page 74)

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By ALAN STENSVOED, A.S.C.



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AS EACH camera is started, one light shines here in burst of whitest concentration. Besides a spot mark on the picture film he still editor in matching picture with sound track.



ALAN STENSVOED, A.S.C., (center) who directs photography of show, explains operation of special lights to Art Linkletter. At left is John Swends, producer of "People Are Funny," at Stensvoed's left, director Ivo Achius.

provided what is probably the nearest approach yet to automation in cinema photography.

Two important production factors led to design and construction of the camera panels: 1) it enables me as director of photography to exercise complete control of the pictorial recording of the show; and 2) it enables us to effect substantial savings in negative costs by running the various cameras only when they are recording usable takes, instead of having all cameras run continuously, as is the case with some other multiple camera systems. We have thus been successful in reducing the show's weekly consumption of negative from an average \$2,000 foot to an average of \$6,000 foot—a saving that not only includes film cost, but also the cost of handling the film, and developing and printing. We use the new DuPont No. 4 negative, which has given us excellent results.

For those who are not familiar with "People Are Funny," it is what we call a "variety" show in which people chosen from the audience become competitors, undertake amusing and sometimes embarrassing tasks to win cash or merchandise, and otherwise prove that "people are funny." This format makes it necessary to photograph the show in much the same manner as in live television, with the cameras covering the activities continuously from various angles. The show is filmed each Tuesday evening at the Linkletter Playhouse on Vine street in Hollywood.

Five Mitchell 25mm cameras, augmented by a standby (making six in all) photograph the show, under the control

previously mentioned. Looking at the cameras from the back of the theatre auditorium, No. 1, mounted on a crab dolly, is on the stage at the left. No. 2 is the standby camera, mounted on a tripod, and ready to take over should any one of the other five cameras develop trouble during filming. No. 3 and 4 cameras are mounted on a parallel erected in the middle center of the auditorium, over the heads of the audience. No. 5 is the floating camera, mounted on a hydraulic dolly, and situated in the orchestra pit. And No. 6, mounted on a crab dolly, operates from the right hand side of the stage.

In the beginning, we used only four cameras. I believed that we could gain additional flexibility and thereby cut down further on the amount of negative required by adding the fifth. This we did and effected a savings in production costs of \$240 per show. But the money saving was only a minor factor. The added flexibility the fifth camera gave us now permits the continuous filming of stunts running as long as twenty minutes. Each camera starts out with a 1000-foot film load, and by juggling between the different cameras—starting and stopping as as to spread out the available film during the shooting of each stunt—we can cover an incredibly lengthy piece of action before having to reload the cameras.

The camera sync control unit is located in a glass-enclosed booth at the rear of the theatre, from where I direct the show as it progresses and direct the operation of the various cameras. Referring to the photo of the unit

on this page, the reader may observe the switches and indicator lights which control the various cameras. On top of the panel are five electronic footage counters which show the amount of film in each camera at any time. When a camera is switched on, the footage counter automatically starts to record, and ceases when the camera is stopped. In this way I can observe the film supply remaining in any and all cameras and, when any camera begins to run low, determine what camera to switch on in its place. Negatives are never reloaded until after the filming of a stunt ends, at which time a brief intermission takes place for this purpose.

In addition to providing me with the means of starting and stopping the cameras, the panel also has switches and indicator lights which enable me to signal each of the camera operators whenever I wish a change made in a camera position or a lens. Mounted above the viewfinder of each of the cameras is a small box having three signal lights—red, green and yellow—which are observable by the operator, his assistant, and the grip at all times from their positions behind the camera.

The red light flashes on whenever I throw the switch that starts the camera motor, and remains on as long as the camera is turning. When I flash the green light, this indicates to get in closer to subject or subjects being filmed, either by dollying in or switching to a different lens. When I flash the green light twice, it means to go into a two-shot. Any good operator, of course,

(Continued on Page 146)



PRECISELY WORKING positions of the five Mitchell 25mm cameras used in filming "People Are Funny" are shown here. Cameras are switched on and off by Stenrood who directs photography from booth at rear of playhouse.

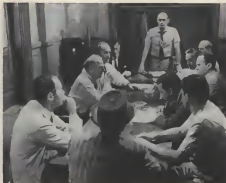


CAMERA SYNC CONTROL panel, designed and built by Alan Stenrood especially for Art Linkletter TV show, enables him to stop and start camera and signal for camera and lens changes.

Filming "12 Angry Men" On A Single Set

Carefully planned lighting and camera angles played an important part in giving impact and suspense to the drama of 12 men deciding the fate of one man in the confines of a small, hot jury room.

By BORIS KAUFMAN, A.S.C.



a jury room where they must decide whether a young boy, on trial for his life, is to live or die. Considering the one-set limitations, the first and most important problem was how to keep the photography of this picture from becoming static; the entire story was to be staged and photographed in a room no larger than an average hotel room.

The second problem was how to present cinematographically the psychological study of twelve men, each from a different social strata of a big city and

A MAJOR problem was how to prevent the photography from becoming static, since the entire story was staged and shot on a set no larger than an average hotel room.

SLOW—Changing the set lighting to conform with the time of day played a big part particularly in motivating the story. Here, an intense argument between the men, a thunderstorm approaching, changing the aspect and mood of the lighting in the room.

THE EVER-PRESENT challenge for the director of photography is how to give each new picture a new and different camera treatment—a fresh viewpoint, camera-wise. Last he repeat himself and fall back on old techniques, the cinematographer is continually challenged to dig deep into his bag of tricks so that his photographic technique does not become stagnant.

Sometimes an assignment is filled with more problems and difficulties than others, as in the case of "12 Angry Men," which I recently photographed for Otter-Nova Productions in New York. Just one look at the script convinced me that here was truly a challenging assignment—photographing a dramatic story within the confines of a single, one room set.

The story concerned twelve men who, as jurors, find themselves locked inside



whose only common denominator was that he had suddenly found himself in a jury room, and was being asked to pass judgment on the guilt of another human being.

The first problem presented the biggest challenge. I had experienced this type of a problem before in one or two pictures, but in a much more fleeting way—for perhaps a sequence or two. But here the entire story was straight-jacketed inside a one-room set, inside a jury room, in which not twice men, whose backgrounds, attitudes, problems, and reasons behind their decisions had to be shown photographically as well as in the dialogue.

After much thought and discussion, we decided there was only one way to overcome the possibility of static cinematography. That was to turn the disadvantage of the single set into a pictorial advantage. We decided to use the camera to play up the feeling of confinement and thus contribute dramatically to the total expression of the story, making the confinement an integral pictorial part of the mood.

In good cinematography the camera should never distract the audience from the basic theme and never move without justification. And yet the static condition inherent in the one-set limitations of this story had to be overcome.

The camera had to reveal at the outset the basic character of each man, and his personality traits had to be elaborated upon later in the film to reveal the inner psychological reasons for his behavior.

Because of this opening scene was the longest, single continuous take I have ever done in all my years as a cinematographer. It ran for seven consecutive minutes. It was made up of 18 separate camera movements which actually showed 18 basic fact situations. It also established the basic style and mood of the picture.

During this seven-minute take the camera introduces the twelve men in a very casual way as they bump into each other and exchange casual remarks which are not at all related to the case on trial. Yet in this way each character immediately begins to relate to every other man in the room and to the story.

From the moment the foreman calls for the first vote we are caught up in a tight, tense drama which never breaks until the end of the film. The screening

CAST & CREDITS	
"12 Angry Men"	
SIDNEY HUNTER	
LEE J. COYNE	ED WIGGIN
E. G. MARSHALL	JACK WARDEN
Jack Klugman	Joseph Sweeney
Marvin Belam	George Yule
Robert Walker	Edward Bonas John Reilly
Produced by SIDNEY HUNTER	
Associate Producer: RICHARD ROSE	
Directed by SIDNEY HUNTER	
Production Supervisor: GEORGE ARDIN	
Story and Screenplay: RICHARD ROSE	
Director of Photography: ROSE KALFMAN	
Art Director: Robert Marshall	
Film Editor: Carl Lerner	
Assistant Director: Donald Krass	
Camera Operator: Paul Hildner	
Sound Engineer: James A. Gleason	
An Orion-Nova Production	

time is exactly equal to the actual time depicted in the story. Thus, in the hour and one-half the jury spends in the jury room it was impossible to break away from the continuity of the story, to flash back, or attempt a time-lapse. There was nothing for the camera to do except to show one direct contrasting story carried further and further along inside the small, hot, locked room.

This picture was shot only one way, to be edited only one way. We didn't "protect" ourselves in the usual way, but decided on the spot how the sequence was to be shot.

Therefore, each angle was checked to determine the best composition with respect to the visual impression we were seeking, and to the action involved. So that when it came time to roll the camera, everybody concerned knew exactly what they were going to do.

The directing technique employed amounted to a great degree from Sidney Lumet's television background—where, because you are only allowed one take during the actual show, everything is ironed out during rehearsal. Which, when you have as fine and sensitive a feel for camera-work as Lumet, plus his

talent and memory for details, combined with a tight script by Reginald Rose, and sensitive performers like Henry Fonda, Lee J. Cobb, Jack Warden, and others in the cast, can prove to be a very successful method of filming a motion picture.

There was another pictorial technique we used to emphasize changes in the mood of the story and in the interlocking themes of the plot. This was in the basic lighting patterns, there in all.

First, the lighting suggests bright daylight as the hot afternoon sun shines through the windows as the jury files into the room.

The second stage is reached when the action in the room becomes tight and charged with the oppressive heat of the summer day; the camera moves in again and again to show the tense, electric undercurrents related to the drama going on between the men of the jury. This effect is then heightened by darkening shades in the background, a sudden darkness in the room, and the sound of thunder off in the distance.

And finally, the pictorial effect of a rainstorm which pours down on the city, and breaks the tension within the room at the height of the emotional battle that has been going on for over an hour and a half. The camera makes the most of the effect of the sight and sound of rain beating against windows, raising the tension of the jurors to the highest point as the last of them finally admits there is room for doubt. The storm breaks only after the jurors' fateful decision has been made.

As we cut to the exterior of the Courthouse, with a wet column heavy in the foreground, the men of the jury disperse into the city and the anonymity of the crowd with nothing more to remind us of the drama that took place behind the closed doors of the jury room. Except the coming of night and the wet pavement as the "12 Angry Men" fade into darkness.

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UNDER THE very limited filming conditions encountered, the shooting script could only suggest camera procedure, such setup and camera angle was carefully thought out by cinematographer Kaufman (left) and director Sidney Lumet before the scene was shot.



THE UNIVERSITY shoots many productions with its "realistic" system. Here, two cameras are used—an Auricon-Pro and a Cine Special in a student-made kluge (2nd camera lens left in photo). Both run continuously during a take and provide two different aspects of the action for editing and intercutting. 35-2 film is used at a speed of 1/8.

Film Production At The State University Of Iowa

By STANLEY E. NELSON and JOHN MERCER

(Continued from the October issue)

IN THIS, concluding article, the authors described the scope of activity of the State University of Iowa in producing motion picture films. The University also conducts classes in cinematography and film production. In the first semester, the authors related, lectures

cover 21 different phases of film production, equipment and procedures. Second semester is devoted to film planning, script writing, directing and cinematography. In the concluding article, this phase of the University's activity is described in greater length. ED.

SYLLABI FOR THE COURSES have been developed by John Mercer. These syllabi are available from University Campus Stores only to students registered in the courses or to persons who request them through Mercer. This is a matter of University policy, aimed at insuring a supply of material for the students. Persons who wish to purchase the syllabi (they are sold on a non-profit basis) can usually obtain copies by writing to John Mercer at the Television Center.

The Television Center has always produced film clips for its productions, along with some program-length or near program-length sound footage. For general production work we have a Cine Kodak-Special, an Auricon-Pro, Stencl-Hoffman 8-5 magnetic film recorder, Magarecorder, Moviola Model UL20/S, and two editing tables.

We are going full speed ahead on multitrack. We use two cameras, one an Auricon-Pro and the other a blimped Cine Kodak-Special, both running continuously during a take. We have found that by using Tri-X film at Weston 400 we can stop down to f/8 in our studio. This gives us great depth of field and eliminates the necessity for following focus in most cases. We can shoot only five minutes at a time, and must reload and mutate for each roll.

Selected students occasionally produce short sound films for workshop credit. We have recently produced a film on archaeology and a puppet film.

We also use Bell & Howell 70-D series cameras equipped with wide-angle, 1-inch, and 2-inch lenses. For our studio we have a room which measures 47x33x20 feet, with three permanent sets built of ten-foot flats. We have several different kinds of lighting equip-

(Continued on Page 745)



DIRECTED STUDENTS occasionally produce short sound films for workshop credit. Here a Bell & Howell 70-DA camera is being used on a dolly-mounted tripod on a studio set.



STUDENTS HAVE access to the film editing tables, each is equipped with splicer, rewinder, viewer, film bin, light box, editors and film cement. Other equipment is available for 35mm.

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FIG. 1—Simple setup for photographing TV spots and commercials with superimpositions and other effects combined in a single take, such as illustrated in Fig. 2 below.



FIG. 2—Twin mirror device for making effects in the camera by sliding mirror (1) before lens, direct view is cut off and image to be superimposed is picked up by lens, as reflected by mirror (2). Gadget is mounted on base plate (4).

IT'S DONE WITH MIRRORS

Simple gadget makes it possible to produce smart, semi-
animated TV spots or commercials in a matter of hours
without need for costly optical printing.

By R. C. HORN

Tele-Film Company, Spokane, Wash.

ONE OF THE vexing problems encountered by many film producers entering to TV advertisers is the high costs involved in making effective film

commercials on the pin-money budgets of the average small-market video advertiser.

A television commercial or spot an-

ouncement must pack a tremendous amount of selling within its allotted time, every fraction of a second of the air time must be utilized to the limit.



For this reason special photographic effects are being employed more and more in TV commercials to put the greatest amount of message on the limited amount of film. This action or visual information is often dissolved or overlapped to further reduce the time required to put the message across—something that usually requires costly special laboratory treatment in the production of the film.

Here is a tried and proven method of producing TV commercials having modern professional effects, at a cost so small even the low-budget advertiser can profitably use them. While the method has its limitations, it is applicable to a wide range of local spot announcements and commercials; and the investment necessary for the film producer who would employ it is nominal, indeed. For the essential equipment necessary is a sound camera and a simple gadget employing mirrors that any cameraman handy with tools can rig up in a very short time.

The instant frame enlargements reproduced at the bottom of these pages illustrate a TV commercial produced with the mirror device, which is shown in Figure 2. The example is a typical low-budget commercial having all the class of a professional job turned out by means of special optical effects, painting. The word "Money" and the name of the Loan company is introduced in the opening frames with narration over. Then the speaking narrator appears in a wipe-on effect as the word "Money" is wiped off and the name "Local Loan Co." is superimposed.

Attention is called to the diagram (Fig. 4, on this page) which shows positions of the two mirror units with respect to the camera and the subjects being filmed, as seen from above.

Figure 1 shows the single camera setup employed in filming the entire com-

mmercial in one take. Here the mirrors are in position, as shown in Fig. 4, causing the text on the black card to be recorded by the camera lens. As the operator moves the larger mirror of Unit A (Fig. 4) to the right, the text disappears in a wipe-off effect revealing the announcer. With the mirror moved from its first of the lens, it no longer reflects the image from the card, and the camera picks up the announcer direct, where he is seated in the position indicated as "Scene #1" in Fig. 4. A second mirror of reduced size is then moved to the left and picks up only the name of the sponsor, causing this part of the text to be superimposed over the announcer. Then the sectional mirror is moved to wipe off the sponsor's name, the card changed, and the sectional mirror moved back again to reflect in the lower region of the scene the sponsor's address. Producing these same effects by standard lab painting procedure might very well have made the commercial a profitless venture for the producer.

The effects device illustrated and described here was designed for use with an Auricon Cine-Voice camera fitted with a Pan-Cinar zoom lens. It makes it possible to cut from one scene to another with the camera without stopping it, or without moving or panning it in any way. It is only necessary to move one of the sliding mirrors into position in front of the lens, and a smooth, clean transition results.

In actual practice the effect has been accomplished in as little as three frames and can be as fast or as slow as desired. With this mirror unit it is pos-

sible to produce film commercials with continuous sound tracks and many changes of scenes without stopping the camera.

The mirror unit "A" (Fig. 4) contains slots for two mirrors, which are easily removed and interchanged during filming. One mirror is large enough to accept the full field of the widest angle lens used. The second mirror is cut to reflect only the lower $\frac{1}{3}$ of the field.

Three mirrors are mounted in brass frames to allow free and easy movement in the channels of mirror unit "A". Exact sizes are given to cover the field of the Pan-Cinar 17mm to 70mm lens; however, size of the unit could be reduced where lenses of smaller diameter are to be used.

As may be seen in the diagram, if the mirror in unit "A" is moved into the field in front of the camera lens it will reflect the scene picked up by mirror "B". This mirror is movable on a vertical axis and its angle may be adjusted to accept an entirely different scene from that of the unobstructed lens.

By moving the mirror into position in front of the lens, scene #1 will be wiped off and scene #2 will be wiped on simultaneously. Having blocked out scene #1, it is then possible to change this scene and, when called for, return to it by moving the mirror back out of the field of the lens.

If it is desired to superimpose lettering onto a scene, a "two-way" mirror may be used on the same manner. The lettering to be superimposed will be at scene #2 and the main subject at scene #1. The use of a two-way mirror to

(Continued on Page 745)

FIG. 4—Top view diagram showing arrangement of camera, mirrors and subjects indicated as "Scene 1" and "Scene 2". Mirrors are in position to photograph the "Money" card, shown in Fig. 3. When mirror in Unit "A" is moved to right, lens picks up announcer in position of "Scene 1" in a wipe-on effect.

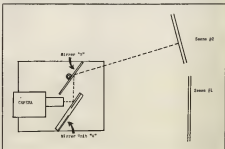


FIG. 2—Front view diagram of a typical TV spot announcement produced with the camera setup described here. As shown in Fig. 1, camera picks up text of card reflected in mirror (B) in Fig. 2. Then mirror (B) is moved back to permit lens to pick up announcer, seated in chair. Other manipulations of lens superimpose sponsor's name and later his address.





Ring-side



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Everybody thrills to a fight! Especially when it's on a wide, wide-screen where every seat is down front! Before this show could go on in this way, time, work, and money went into perfecting new technics in production, processing, and projection. Members of the Eastman Technical

Service, working hand-in-hand with the industry, are happy to have helped develop these technics.

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HIGH ON A CAMERA ROOM on location in Italy, cinematographer Jack Cardiff, center, loans his viewing glass to director King Vidor

far left of a scene for "War and Peace" before telling the Vista-Vision camera

Jack Cardiff's VistaVision Venture

Some highlights on the photographic problems encountered and the techniques employed by Britain's ace cinematographer in filming one of the most talked-about pictures of the year.

By DEREK HILL

BECAUSE TWO CINEMATOPHILERS are credited with the photography of "War and Peace," no approval of the camera work on this five production can begin without first defining the individual contributions of each of the artists, both of whom are considered tops in their field.

The credit titles in "WWP" list Jack

Cardiff as director of photography with additional photography contributed by Aldo Toni, a leading Italian cinematographer. Unfortunately I was unable to interview Mr. Toni, but Mr. Cardiff, having recently returned to London after a four-year stay in Rome, where much of "War and Peace" was filmed, was just starting a new photographic

assignment, "The Sleeping Prince," and was accessible for interviews. Briefly, according to Cardiff, some of the battle scenes and all of the Napoleon sequences were photographed by Toni; the rest of the photography of "War and Peace" is his.

Cardiff, whose photography of "Black Narcissus" in 1947 won him an Oscar,

has been named by several reviewers as a certain contender for another Academy Award as a result of his Technicolor and VistaVision photography of "War and Peace."

Before he started filming the Tolstoy epic, Cardiff spent two weeks in Hollywood familiarizing himself with the VistaVision cameras and shooting a number of tests. This was to be his first film in VistaVision, and two brand new VV cameras were flown from Hollywood to Rome for the production. Eventually four VistaVision cameras were made available, and these were used in photographing the three large battle scenes, one of which involved 3,000 extras.

"My experience in shooting 'Scott of the Aztec' proved highly valuable when it came to shooting many of the

scenes staged in snow and snow storms," said Cardiff. "I'd become familiar enough with various snow scenes to be able to recreate the effects I wanted. But sometimes I was just lucky with the location. When we shot on the banks of the Arno river, for instance, there was a slight fog which offered wonderful pictorial possibilities."

"But we also had to create snow and winter aspects for some of the scenes. Actually, a large proportion of the film was shot during the height of the Italian summer, when almost every Roman deserted the capital to escape the relentless heat. To photograph an important winter scene at this time, it became necessary to smother powdered plaster over a square-mile location site to give it the appearance of frost."

In August," Cardiff continued, "we

couldn't get the Cine Cite stage space we wanted, so Metro-Goldwyn-Mayer had booked it for its production of 'Ben Hur,' which had not yet even been started. So we were obliged to take space in a tiny studio across the road. It was so small that our one set came to within a foot of the walls on every side. Luckily, fire restrictions in Rome are less severe than in Britain.

"By the time we'd lit this set, the temperature was practically bursting the thermometer. And on top of this, the interior we were shooting were supposed to be mid-winter scenes in which members of the cast had to wear fur coats and appear to shiver in the cold! The floor was literally soaked with perspiration before we began rehearsal."

In all the "interior" snow scenes which were actually shot in the studio,



TYPICAL of the Cardiff cinematic touch is the inspired lighting given to the many authentic interiors in "War and Peace."



BIG SET for big picture is this city erected near Rome for "War and Peace," locale of many of the picture's great scenes.



MOST IMAGINATIVE photographic treatment is this scene of death in the snow, staged and shot indoors on sound stage.



ANOTHER realistic "exterior" shot indoors, made all the more real through Cardiff's skilled lighting and camera treatment.



AN INDICATION of the elaborate and detailed planning that went into the making of "War and Peace," Ponti-de Lencastre Production for Paramount release, is seen in this photo of Franco Barchia, American art director and production designer on this epic which King Vidor directed in Europe. All important scenes were first visualized in sketches prepared by Barchia.



LOOKING DOWN on some of the 3,000 extras used in the battle scenes of "War and Peace," as they struggle into their 1812-type military uniforms for major battle sequences. "Dressing room" is converted sound stage in Italian studio.

Cardiff used a panel of glass, sprayed white, plus a pale green filter before the lens in order to impart a slight mist effect to the scenes. One sequence in the picture, which has attracted much praise for its photographic excellence, is the action of the duel in the snow. Many expert photographers have unqualifiedly declared these scenes actual exteriors. The fact is, however, that they were shot on Stage 5 at Rome's Cine Citta studio. To achieve the very real effect of dusk on a wintry night, Cardiff used a glass before the camera with sky painted on the upper portion, as the wide angle lens used in covering the great sweep of the set took in too much vertically.

Though this is a technique which Cardiff has used before, it was new to the Italian technicians, who were rather dubious about the outcome. For a sun effect in the same sequence, Cardiff employed an original trick of directing a lamp onto the sky area of the painted glass mounted before the camera lens. A combination of colored filters plus a fog filter gave Cardiff the effect he sought, and resulted in one of the most talked-about scenes in the film.

All rushes of "War and Peace" had to be sent to London and then returned, which meant it was a week instead of the usual day before the work could be seen. Otherwise Cardiff enjoyed Italian working conditions. He particularly appreciated the freedom from the union restrictions which beset London studios.

"When I wanted that glass painted with a sky, I just picked it up and did it myself," he told me. "In London that would have caused a strike, just because it wasn't strictly my job."

"War and Peace" was in many ways a cameraman's holiday," Cardiff assured me. "It was a realistic subject and it demanded a straightforward, raw treatment. I could light faces with flickering firelight, the whole approach was deliberately broad, almost rough."

The contrast between "War and Peace" and Cardiff's current "Sleeping Princess" assignment could hardly be greater. From the cameraman's point of view the latter is a typical lighted comedy, with the maximum of lighting and camera control. Closeups, especially of Marlene Dietrich and Sir Laurence Olivier, are of prime importance.

Cardiff's major problem is caused by the camera dolly he uses. It has a unique wheel system which allows the camera to track sideways at right angles to the normal forwards and backwards movement during the same take. This freedom of movement results in considerable difficulties in placing lights out of camera range, as the field covered during one take can be enormous.

(Continued on Page 748)

SHOOTING NIGHT SCENES IN DAYLIGHT

By CHARLES G. CLARKE, A.S.C.

Director of Photography, 20th Century-Fox



CONVINCING "day for night" scenes, whether in black-and-white or color, involve the use of filters and a degree of underexposure.

23A (light red). The Wratten 25 is normally used where ample light prevails; it has a filter factor of 7. The 23A is better suited to semi-shadow areas, as it provides correction with a smaller exposure factor, namely 4. In addition to the filters, exposure should be reduced about two stops. This not only increases the effect of the filter used but also decreases detail in the scene to further enhance the illusion of night.

It has long been the contention that the sky should be rendered as dark as possible in "day for night" shots. Except where a very blue sky prevails, this is not always possible (if any detail is to be retained in the foreground areas). Very often a neutral wedge sky filter is employed to hold back the sky in shots of this kind. Use of this filter is particularly advantageous when filming with backlight; and back-light is highly desirable for night effect shots, rendering as it does an outline of objects in the scene in a sort of semi-silhouette, with an absence of detail in the dark areas—which is natural in true night scenes. It should be remembered, however, that the sky is brightest when back-light is employed; there is no blue color to be filtered out, so it must be absorbed by the wedge-type sky filter.

(Continued on Page 732)

CINEMATOGRAPHERS in all fields of motion picture production are frequently called upon to shoot night scenes, which for one reason or another must be photographed in daylight. In the major studios this is called shooting "day for night." To obtain a true night effect in daylight often presents problems, whether the production is in black-and-white or color. Over the years, numerous methods have been evolved to aid in the creation of night effects, and not all cameramen follow the same procedure. My approach to the problem is set forth here with the hope



Charles G. Clarke,
A.S.C.

it will benefit the many readers who have written to the editor for information on this subject.

To shoot "day for night," using black-and-white film, the two main requisites are over-correction and under-exposure. Over-correction is usually provided through use of filters, such as a Wratten 25 (deep red) or Wratten



IN THIS "DAY-FOR-NIGHT" shot, the illusion of nighttime was enhanced by the inclusion in the composition of the two incandescent headlights, the lighted windows of the railway station, and the lamp hanging over the entrance at the rear. Note how the intensified illumination of all these "beats" through the prevailing daylight—necessary to provide the correct intensity in this filtered night shot.



JOHN DABORN, British cine amateur, checks storyboard sketches for his ambitious animated cartoon production, "The Battle of Wangapoo." A cooperative amateur studio under direction of Daborn, this won a top award at Cannes Film Festival.



ALL THE PROCEDURES followed by the professional animation studios were employed by Daborn and his Grasshopper Group associates in making "Wangapoo." Here he checks a key check against his log sheet, determining number of frames for it.

The Grasshopper Group—A Cine Amateur Cooperative

By HAROLD BENSON

BRITAIN'S BEST-KNOWN cine club, the Grasshopper Group, has only been in existence for three years. But already its unique method of working has attracted many of the most celebrated amateurs in Britain to its ranks. For the Grasshopper Group, unlike most local cine organizations, draws its members from all over the country and offers the most far-flung enthusiasts a chance to take part in its productions.

The system employed offers valuable lessons to American amateurs anxious to combine their talents with those of equally keen cine addicts. Among lone

workers the expert amateur cameraman is often a hopeless scriptwriter. The would-be director finds himself short of a cast. An outstanding editor may have no idea of the fundamentals of sound recording.

Even in an amateur group specialists in a vital sphere may sometimes be lacking. Or a shortage of equipment may hold up production. But with a nationwide club like the Grasshopper Group, the talents and apparatus are unlimited.

In 1953 John Daborn, a young commercial artist, was on the idea of a cine

group for enthusiasts with particular interests in two fields of film making—cartoons and experimental work. The first may seem an ambitious challenge to amateurs, but Daborn had already become the best known amateur in Britain as the result of two painstaking cartoons he produced whose technical qualities were comparable to those achieved by professionals.

With "The Millstream" and "The History of Walter" he had won almost every trophy available. "The Millstream," which runs for only four minutes, involved fifteen months work, two

thousand paintings, and thousands upon thousands of preliminary drawings and sketches. The animation stand was an upturned kitchen table. Daborn was just 21 at the time.

"The History of Wabon," the story of Daborn's home town, was an even more prodigious effort. It was three years in production, and involved exposing 90,000 frames of film, one at a time. Tracks, pans, tilts, wipes, dissolves, double and treble exposures and complicated title effects were needed, and Daborn built his own animation table for the purpose.

Both cartoons won places in *Amateur Cine World's* "Ten Best Films of the Year" contests, and "Wabon" was awarded Film of the Year trophies at both the Cannes Festival and the UNICA contest, where films from sixteen countries were entered. Later "Wabon" was screened among the cream of the professional shorts at the Edinburgh Festival.

After the success of these two films and two tentative live-action shorts, Daborn appealed for members to help form a cartoon and experimental organization. With a nucleus of only a dozen or so members he started work on "Two's Company," the first amateur experiment in production—the single frame live-action technique pioneered by Norman McLaren.

The name "Grasshopper" was suggested during the production of this comedy. It had a suggestion of pixillation, with a hint of madness, and the

JOHN DABORN, founder and chairman of Britain's Grasshopper Group (the organization, it noted the country's most ambitious cartoon, having won numerous awards for his ideas after film. Group affords one member opportunity to work respectively with other members in making perfect film.



alteration proved so catchy that the Grasshopper Group was soon a familiar tale. Plans for a Group cartoon provided Daborn with his first opportunity of testing the club's unique financial and geographical liaison.

"The Battle of Wangapore" was to be the first amateur sound-on-film color cartoon ever produced. Clearly it was going to be expensive—more expensive than lone workers could afford and even beyond the resources of many cine clubs. Daborn's scheme was based on the possibility of finding a sufficient number of enthusiasts who would be prepared to buy shares in the film at 51 each (\$2.00) without promise or even likelihood of getting their money back.

The idea may sound Utopian; but today "The Battle of Wangapore" is a fact. Already it has won an *Amateur Cine World* Ten Best trophy (the "Oscar" of the cine movement) and the Grand Prix at Cannes. It has been screened on television in Britain and may soon be seen on television screens in France, Italy and Switzerland.

Who are the people prepared to finance a film knowing that they cannot make a profit (as any profit automatically goes into Group funds) and may be throwing their money away altogether? They are fellow enthusiasts who appreciate that when they themselves wish to make a film, the people they have supported will be prepared to assist them in turn.

For every member of the Grasshopper Group is entitled to submit ideas, synopses and shooting-scripts to the Grasshopper Committee. If the majority of the committee approves, the film idea is adopted as a Group production.

The author, while being responsible for as many roles in the production of the film as he wishes, may call upon other members for any assistance he requires. He may need a lighting technician or the loan of an animated viewer. His requirements are announced in the pages of *Grasshopper News*, the Group's quarterly magazine.

The majority of members live in and around the London area; but active production is often spread throughout the country. Again "The Battle of Wangapore" proved the possibilities of this arrangement. Amateur artists all over Britain sketched and painted scenes for the cartoon at home. Details of the same sequence were prepared several hundred miles apart. Close co-operation was maintained by mail throughout the two and a half years of production. Several of the painters, writers and animators have never even met.

With live-action productions the limitations on postal co-operation are obviously severe. But even here the development from synopsis to final shooting script, set designing and even editing can be undertaken by members anywhere in the country.

The latest Group production, "Bride and Groon," received its public premiere only a few weeks ago. This is another pin-styled comedy, this time in color, with a specially composed optical sound track. It seems to be as likely a contender for an amateur Oscar as "Two's Company" and "The Battle of Wangapore."

Nevertheless, the Group's real value lies not in the number of shields and cups it has won, but in the encouragement.

(Continued on Page 130)



DABORN at work at his homemade animation stand, shooting scenes for "The Battle of Wangapore," in 16mm color.

Simple Animation Techniques

How to film an animated
insert using a Bolex H-16 camera
and Bolex Titler . . .

By PETER GIBBONS

(Reprinted by permission from Bolex Reporter)

DURING THE ACTUAL shooting of animated sequences, each scene or part of a scene must be filmed one frame at a time because of the exposure problem, as I pointed out last month. It would be impossible to have consistent exposure on the screen if in some places the film was exposed one frame at a time, and in others the camera had been allowed to run continuously, even though it was "hold" footage and no action was taking place.

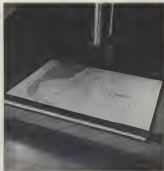
Now that the art work and the exposure sheet are finished, it is time to set up the camera. It must be set up rigidly so that it cannot be moved accidentally. Remember that the Bolex will have to be wound from time to time and that if it is moved from its original position, all the work that has already been done will be absolutely worthless. An important device for this kind of work is an animation stand, like the Bolex Titler used in a vertical position, as shown at right. With this versatile piece of equipment the art work can be put in place and photographed quite easily. Another essential item is a Bolex cable release. Since all the work has to be shot one frame at a time, this necessary cuts down not only the labor involved but the possibility of moving the camera and so spoiling all the previous frames that have been shot.

A great aid in signing the background and other parts of the picture is the Bolex Prismoir Focuser. This little device insures perfect framing and alignment. Nothing is more disappointing than finding, after the work has been done, that the art work was out of line with the frame, or the picture too far to the top, the side or the bottom of the film frame.

If you do not have the Bolex Titler, the camera can be mounted on a wall bracket, an enlarger, or even a tripod, provided the tripod can be tilted so that the camera can be pointed straight down. Whatever method is used, rigidity is essential. Animation can be shot against a wall, with the art work held vertically, but it is very awkward; often there are as many as three or four cells on the background at the



USING THE Bolex prismatic focuser to line up the art work on the animation table. Photoheads in reflectors set at correct angle prevent reflections from slick surface of cells bouncing toward camera lens.



THE SCENE LINE is the animated one completely shown in the top or "overlay" cell, as shown here. The animation is done in scenes, with sections of the film being "scratched off" or erased between the single-frame exposures.

same time, and for reasons of focus, alignment, lighting, etc., it is necessary to keep them close together. This is most efficiently done when the art work is in the horizontal position, by placing a piece of plate glass over the cells whenever an exposure is made. I use an enlarging easel, which I fasten securely in place by screwing it to the table. A piece of glass, cut to size, is fastened to the cropping device. With this as a ploy, it is a simple matter to lift the glass whenever a change has to be made in the art work. If the art work were held vertically, this would be almost impossible.

Double 45° angle lighting is used. In this type of lighting two lights are mounted opposite each other and 45° above the horizontal plane in which the art work is held, as illustrated here. This gives equal illumination over the entire area of the field, eliminates any reflections that might be picked up from the shiny cells, and prevents picking up any texture from the background.

Make certain that none of the shiny surfaces of the camera or the stand are reflecting from the cells or the glass plate into the lens. If they are, put black photographic tape on them to eliminate these reflections. These should be observed from the lens position as only those reflections seen from this position will record on the film.

The exposure is determined in the usual way with either an incident light meter or an 18% gray card and a reflected light meter. New photo-flood lamps should be used to reduce the possibility of a lamp burning out in the middle of a sequence. If a new lamp burns out after a short time and it is replaced with a new one, there will not be as great a change in color and exposure as if an old one burned out and was replaced with a new one. Photo-floods vary considerably in intensity and color if they are burned for any length of time.

With the Bolex set up and the art work in place and illuminated, shooting is ready to begin. The camera is positioned upside down with respect to the art work, because we are going to shoot backwards. With the camera loaded with film, focused, and the lens aperture set to give the right exposure, we are ready to refer to the exposure sheet illustrated and described last month. (See Fig. 3, page 675.) The instantaneous exposure of the Bolex 16-16, shooting one frame at a time, is 1/25th of a second. The frame counter should be set at zero. This counter can be used to a very great advantage because a record can be kept as the work goes along.

Let us now look at the exposure sheet. Since we are going to shoot upside down, or backwards, we will have to work from the bottom of the sheet up.

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The footage in frames is coupled and accumulated from the top to the bottom, but since we are shooting from the bottom to the top we can (1) use these figures and subtract as we go along, or (2) accumulate the footage from the bottom, and use that. In any case, most of the planning, working, and thinking will have to be done in reverse.

We start with a two-second fade-in of the background over which are the two exposure cells. These consist of one clear cell next to the background, and the route cell with the three legs of the journey painted on it securely fastened in place in perfect register. Remember that the route cell always has to be on top so that the route lines can be scratched off. The "highlight" cells are not in, but are blinged at the side of the background, and can be folded in easily when the time comes. Only one blank cell is in under the route cell since only one "highlight" cell will be in at any one time. This fade-in could be a "cut" instead but I recommend the former here, and it can be done in any one of several ways. It can be done with an Iris Vignette on the lens, or by starting with the lights completely switched off and fading them in completely onto the subject (using a rheostat control) with a pre-determined exposure.

Next comes the five-second "hold" footage (120 frames) in which no action takes place, but which has to be shot one frame at a time for reasons of exposure. After the last frame has been taken, we start removing the route line from Nassau to New York, starting at New York. On the map the distance is approximately seven inches. The line is to be completely eradicated in 72 frames, which means that on each exposure approximately 1/70th of an inch is to be removed. It is scratched off with a stamp, a pencil-like piece of paper or cloth sold in artists supply stores. The stamp removes the paint without scratching or marring the cell in any way.

The procedure is as follows: Lift the platen, remove approximately 1/70th of an inch of the line, lower the platen, and make an exposure; lift the platen, remove another 1/70th of an inch of line, lower the platen, and make another exposure—and so on until the entire 72 exposures are made and the entire line is completely removed between New York and Nassau. If the number of exposures does not come out to exactly 72 it does not matter too much since this was computed on a time basis and a few frames one way or the other will not make any difference. However, the exposure sheet should be changed to correspond with the footage counter on the camera so that everything can be kept straight.

Next come three feet of "hold" footage which is shot, as before, one frame

at a time. This continues until the *Namus* highlight is popped in. At this point the blank cell is removed and the cell with the *Namus* highlight is folded into place. (Checking the exposure sheet, we see that 5 feet of "hold" footage is to be shot (one frame at a time) and then this cell is to be removed. The blank cell is then put back in once more and 24 more frames of "hold" footage are shot, one frame at a time. I keep repeating this over and over because it is a great temptation to run the camera continuously on these runs where no action is taking place. This might seem like a long-drawn-out procedure, but it goes fairly quickly, and if it is done well it will be more than worth the effort.

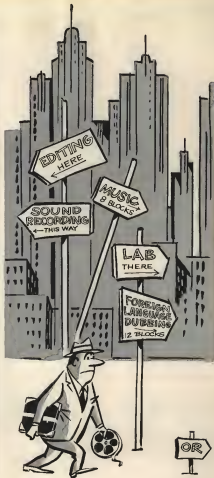
We are now at the point where we have to scratch off the line from *Namus* to *Bermuda*, starting with *Namus*. The same thing is done here as was done with the *New York-Namus* line. Divide the line into parts approximately equal to the number of exposures called for, and scratch off the small division after each exposure. Lift the platen, scratch off a bit, lower the platen, and make an exposure; lift the platen—and so on. The *Bermuda* highlight is brought in and taken out again exactly the same way the *Namus* highlight was done, and the line from *Bermuda* to *New York* is scratched off the same way as the other two were.

After the entire line is scratched off, 120 frames of the background with two black cells over it are exposed (there is nothing on the route cell line now). Then comes a two-second *Fade out* and the job is done.

Supplies needed for simple animation are as follows:

- 1 map showing proposed route
- 4 sheets of cellulose acetate
- 1 jar of Brunshauer's white water-mix paint
- 1 jar of Brunshauer's colored water-mix paint
- 1 small brush for paint
- 1 roll one-inch masking tape
- 1 stump pencil
- 1 plate glass platen cut to size

It might seem like quite a task, but the work goes fairly fast once the technique becomes familiar. The important things are patience, precision and persistence. After you have worked at it for a while, you will find that in addition to it being fascinating work it will add a touch of professional excellence to your movies that you will be proud of every time you show them.



(Continued From Page 715)

I always use a neutral density type filter having a transmission factor of about 50%—rather than the tinted filters for night effects, for they retain the same absorption qualities regardless of the saturation of the filter used with the film.

Up to this point, we have considered shooting "day for night" in open land scenes or in exterior longshots where detail in the actors' faces is not important. But where it is important to show such detail, other factors inject themselves. The red filters, being overcorrective, naturally increase contrast and thus render a face chalky white on the highlight side, and only black on the shadow side. This harsh result is not at all favorable and can easily be avoided by using a combination of 23A filter with a Wratten 56 (light green) filter. With such a combination, all the good qualities of the 23A red filter are retained and its objectionable features are removed out or neutralized by the green filter. The latter prevents the "chalking up" of highlights and allows some of the shadow light to be photographed. The filter factor is six and is computed without any additional cut in exposure.

In studio practice, regular incandescent lamps are used instead of photofloods, with current supplied by a small generator. Such lamps do not have much effect when used in strong sunlight, so I usually photograph such scenes at dusk. In studio parlance, we call it the "magic hour"—that period when there is enough overall light for



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a basic exposure, yet not enough to minimize the effect of the lights in the windows, street lamps, etc. Because the prevailing light at dusk is so weak, no correction filters are used, though use of a neutral wedge is sometimes necessary where sky is included in the scene. Also, it is sometimes necessary to side-light the actors in the foreground with light from photo lamps or other light source because of the strictly flat light which prevails at this time of day.

When shooting on location, one can expect to encounter a certain amount of overcast weather to hinder scheduled filming. For this reason I have my building windows prepared with lights and tracing paper so that we can shoot "day for night" scenes if we get soaked in. Needless to say, this pleases the production office, for we are not forced to sit around and wait for the weather to clear, and it enables us to get better results in "day for night" shots than when trying to shoot in strong sunlight. This means that booster lights are essential if one is to follow this procedure. This is the system we used when doing a recent series of "home pictures" at 20th Century-Fox—"Smoochy," "Green Goss of Wyoming," "Thunderhead," etc. More recently, when I was shooting scenes for "Love is a Many Splendored Thing" in Hong Kong, I shot "day for night" scenes in twilight suggested by the light from photofloods. Coleman lanterns were also used on the boats.

The procedures discussed thus far apply chiefly to black-and-white photography. However, they differ very little for color photography of "day for night" shots, except that color filters are never used. As the impression commonly prevails that night scenes are Huis's in tone, shooting in color presents the advantage that "day for night" shots can be made "plus-blue" to help the illusion. The simplest method is to use Type A (interior) color film for shooting the "night" scenes out of doors—without a correction filter. Omitting the filter will produce a pronounced overall blue effect to the scene, and this, plus underexposure, will render a pleasing night effect.

As when shooting with black-and-white film, backlight can often prove advantageous when used with a neutral wedge to control the sky. Of course, when no sky is included in the scene, the wedge is unnecessary. Actually, for any "day for night" shot, it is best to avoid sky in the composition. I prefer to shoot such scenes in color in twilight or where an overcast prevails. I usually start filming as soon as possible after sunset, using an A2 ultra violet filter over the lens. As the prevailing light decreases, the filter is removed so that I end up using straight artificial light with no filter whatever.



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Were it necessary to use daylight type color film for night effect scenes, then the light blue filter recommended for converting interior color film to daylight use would be employed without making any allowance for filter factor to grain underexposure. As incandescent light photography white with incandescent type color film, I prefer to use MTZ gelatin filters over the range; this renders a soft orange color generally associated with lamp light. This same color gelatin can be used to filter the side lights and any back lights used on the actors. Unfiltered incandescent light is used for fill or key light on actors' faces. This creates a suitable color harmony that further enhances the illusion of night in the scene. The MTZ gelatin filters referred to are obtainable in large sizes from the Mole-Richardson Company, Hollywood.

As may be seen from the foregoing, there is no set method of photographing "day for night" scenes. The one factor common with any method, however, is that all depend upon underexposure to some degree. Successful

photography of "day for night" scenes will result from a combination of the methods suggested above, applying the best method to each individual scene problem. At best such scenes are only illusions, for in actual night, detail is far less discernible than customarily seen in motion pictures, where some detail is necessary in order to maintain continuity of action or theme.

While discussing the photography of night effects with black-and-white film, I did not go into the matter of using infra-red film because its use is restricted to very exceptional long shots where the change in color tone of trees, shrubs and other scene components is unimportant. Use of infra-red film for "day for night" shots, where actors are employed has not proven satisfactory because of its adverse effect on the rendition of makeup, wardrobe, etc.

In my estimation, the revival of blue tinting or tinting of the film in black and white "day for night" scenes would enhance the effect and prove a novelty to the present generation of theatre-

MULTIPLE CAMERA CONTROL IN TV FILMING

(Continued From Page 723)

knows what a two-shot is, so does the grip and the assistant; so I don't have to see what the camera is getting. I rely on the camera crew to accomplish it properly.

When I flash the cueing light, this means to do just the opposite from what I require when the green light is flashed, i.e., to pull back for wider coverage as in a three-shot. The operator can dolly back or switch to another lens, according to his best judgment. All lenses on the cameras, incidentally, are set at the same stops and taped to prevent accidental change during filming—the exposure having been determined beforehand through meter readings.

At this point it is readily seen that, except for any oral instructions given the camera crews before the show starts, all instructions issued to them thereafter are effect—by means of the control lights. I maintain a single intercom contact, and that is with my diameter board operator. In addition there is a PA system, which I use in talking to Art Linklater or others during the breaks between shots or during the show in those rare instances when a something goes wrong—like a film jam.

There is another important function of the camera sync control panel and that is putting the necessary sync marks on the camera films and the sound track. Sync marks are placed on the camera film by means of a small cue light which is positioned before the lens during the

time the camera is inactive, and is flashed by me as the camera starts by means of a switch on the panel. At the same time, a cue mark is recorded on the magnetic sound track on which is recorded all the dialogue of the show.

The small cue light is snugged in place before the camera lens by the assistant as soon as the red light goes off, indicating the camera is stopped; and it remains in place until the camera is re-started and the cue light flashed. Immediately, the cue light is removed from in front of the lens by the assistant.

Purpose of cueing the picture film and the sound film is to give the film cutter positive, visible marks that will enable him to accurately match up the picture with the track. This is the only system I know of that is employed in multiple camera photography where "exact frame" sync is provided; most other systems have a "count by" of 3 to 10 frames, making it necessary for the editor to search for the exact point where picture matches the sound track.

To further aid the film editor, there is recorded on the sound tape (on a separate track) data which I give orally through a multi-purpose microphone located in my booth. This does not interfere with the show's sound track.

For example, when we start the show—say with cameras 1, 3 and 5 rolling—I call out "Cameras 1, 3, and 5," and this is recorded on the sound track.

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rehearsal, the editor makes pencil notes as a further guide to shooting and editing.

One of the advantages of shooting "People Are Funny" with five cameras is that it frees Art Linkletter and others from any limitation of movement. It is unnecessary to put chalk marks or tapes on the floor to restrict their movements, because the five cameras provide a flexibility of coverage to meet any contingency. Linkletter is given greater freedom, too, enabling him to work more naturally with his costars and show participants.

Furthermore, Art Linkletter is always properly lit, no matter to what part of the stage he moves, because all lighting is from overhead. Flat lighting has been carefully avoided, and we have worked out a pleasing pattern of cross-lighting plus a nice front fill—two 2000-watt lamps with space-age diffusers. All lighting units are controlled from a dimmer board, and each one has a number. I have these memorized so that I can order a light change over the intercom phone simply by referring to the lamp by number.

While positions of the lights overhead are more or less fixed, they can be tilted or re-directed with little trouble. During rehearsal, the gaffer and I go over the lighting and make any necessary changes, and determine at what points certain lights are to be raised or lowered in intensity. This information is subsequently passed on to the dimmer board operator. I keep an eye on the lighting as filming proceeds and order certain lights to be raised or lowered whenever the situation requires it.

After the show has been rehearsed and declared ready for filming, the active function of the director and others practically ceases. From there on it is a matter of recording it on film—to illustrate the show photographically to the best advantage. We provide the editor with the pictures necessary to go with his sound track. The "People Are Funny" television programs you see each Saturday evening over most of the NBC network stations is the result of this cooperative effort.

UNIV. FILM PRODUCTION

(Continued From Page 735)

ment, mostly Caltrans, and can secure additional lights from the television studio when needed.

Students have six editing tables. Each is equipped with splicer, rewinds, viewer, kn, light box, scissors, and Elmo consent.

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system. Attached to the Auricon sound track exposure lamp is a battery which is controlled by a switch on a line about 15 feet long. The director of the show operates the switch. When he "takes" the Auricon, he closes the switch, and the lamp exposes a stripe down the edge of the film. When the director "takes" the other camera he opens the switch. The processed picture negatives are synchronized, and the editor cuts to the Auricon negative when the stripe appears, and to the other negative when the stripe is not present.

One difficulty is that the director cannot talk to the cameramen, but rehearsal largely takes care of this. We are installing tally lights on each camera. They will be operated by the director's switch also. Those lights will enable the cameramen to know when they are not being "taken," and they can change camera position when they are free to break.

We have just completed a film on comic tape, about two thirds of which was multiframe. This film, incidentally, is the first in a series on those departments in the University which are over 100 years old. Also in production are a series on aerodynamics and one on textile design. We hope eventually to secure two Auricon Supers for this work.

We understand that Precision Film Laboratory is now printing alternate sections from three negative rolls using no splicer-in leader. This will eliminate the need for cutting the multiframe negatives.

Funds have been provided for the purchase of a television film and slide projection chair. Since the film projector will be synchronously driven, we will be able to record film narration with ease. We expect that as more students become interested in film our workshop activities will increase.

860.

JACK CARDIFF

(Continued From Page 735)

I was lucky enough to be the only journalist allowed onto the closed set at Pinewood. The precautions and restrictions made me feel as if I'd entered the Iron Curtain.

The lavish ballroom set was one of the most impressive I've seen in a British studio. Cardiff had used yellow filters to give a glow to the rows of glass wall lights, which despite appearances were not switched on. Along with three hundred gowned and cosseted extras, I watched Cardiff shoot a brief dialogue between Monroe and young British star Jeremy Spencer. Collaboration between Cardiff and Olivier, the director, seemed very close.

"Yes," Cardiff told me. "Oliver knows exactly what he wants from his cameramen, right down to the finest detail. I've a tremendous admiration for the way in which he manages to cope simultaneously with all the problems of acting without losing his grasp as a director."

Apart from Hitchcock's "Under Capricorn," with its involved ten-minute takes, Cardiff considers "The Sleeping Prince" his most challenging film to date—largely because of the lighting problems which the dolly presents. Of his own past work his favorite films are "Black Narcissus" and "The Red Shoes."

His next film, at present untitled, will be with director Henry Hathaway, starring Sophia Loren and John Wayne. Locations will include Libya, Tripoli and Rome. But to Cardiff the most exciting aspect of the film is that it is to be shot in Technicolor, the possibilities of which aroused his intense enthusiasm during his last visit to Hollywood.

Early next year Jack Cardiff will turn directing. "Death of a Doll" and "Deep Freeze" are already lined up as his first two films. He won't attempt to tackle the photography as well, but he has very definite ideas on the cameraman he wants.

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PHOTOGRAPHIC ASSIGNMENTS

(Continued From Page 720)

INDEPENDENTS

- JAMES WYNN HOWE, ASC, "The Sweet Smell of Success," (Black-Hill-Lowrey Prod. for UA release shooting in New York) with Burt Lancaster, Tony Curtis and Susan Harrison, Alexander Markandirak, director
- C. PIERCEWORTH RICHARDS, "West of Eden," (Unpublished Prod., shooting in London) with Kevin Spacey and Kay Gallard, Kevin Piersworth, director
- WILLIAM MARSHALL, "Purple Heart," (Del-Am Prods., shooting in Hawaii for UA release) with Les Barker and Matt Blanchard, Howard W. Koch, director
- JOHN WARREN, ASC, "Daughter of Dr. Jekyll," (Wilm. Vandenheu Inc., AA release) with John Agar and Glenn Talbot, Edgar Ulmer, director
- GIOVANNI DI VENANZO, "El Gato," (Rita-Alcázar Prod., shooting in Rome) with Silvia Carboni, Michael Angelo Antonini, director
- MURRY GERTMAN, ASC, "Last Gun on Dufferin," (Fountain Prod.) with George Montgomery, Sidney Salkow, director
- HOWARD DENNIS, "The Call of Duty," (Palmer-Dennis Prods., shooting in Baltimore, Md.) with Mark Kinsick and Dick Van Patten, Bob Murphy, director

KEYWEST STUDIOS

- WALTER STERNER, ASC, Screen of religious (scripted) William Claxton, director

KING STUDIOS

- HEDDAN BAKER, "Death Valley Days," (McGowan Prods.), Stuart McGowan, director

KTU

- STUART THOMPSON, ASC, "Lambie," (Robert Maxwell Prods.) with Jan Clayton and George Cleveland, Les Selander, director
- KENNETH PEACH, ASC, "The Trail of Renjoe Galt," (Grand Prod. for UA release, western) with Sterling Hayden and Darryl Hickman, Sidney Salkow, director

UNKLETTE PLAYHOUSE

- ALAN STENFORD, ASC, "People Are Funny," (Art Linklater Prods.) with Art Linklater, Roy Atkins, director

METRO-GOLDWYN-MAYNE

- JOHN ALTON, "Designing Women," (Columbia Scope and Color) with Gregory Peck and Loretta Swail, Vincente Minnelli, director
- RANDOLPH NAEDEBART, ASC, "Gee Glory," (ColumbiaScope and Metrocolor) with Stewart Granger and Rhonda Fleming, Ray Hayland, director
- GEORGE FOLSY, ASC, "The Seventh Veil," (Columbia Scope, shooting in Hong Kong) with Eleanor Parker and Bill Travers, Ronald Neame, director

- ROBERT BARRON, "Six Stockings," (Arthur Freed Prods. CinemaScope, Metrocolor) with Cyd Charisse and Peter Lorne, Harold Mann, director

- RUSSELL HARRIS, ASC, "This Could Be the Night," (Wadsworth) with Joan Stamos and Paul Douglas, Robert Wise, director

- DONALD DUCKWORTH, "Action of the Tiger," (Eiko-Meyer Prods., shooting in Spain) with Van Johnson and Marlene Carol, Terence Young, director

MGM BRITISH STUDIOS

- PAUL BRIDGES, ASC, "The Steamers," (Ealing Films) with Peter Finch and Rosamund Harris, Leslie Norman, director

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- SID HICKOK, ASC, "I Love Lucy," (Desilu Prods.) with Lucille Ball and Desi Arnaz, James Kun, director, "December Bride," (Desilu Prods.) with Spring Byington, Dean Jagger, Frances Rafferty, Jerry Thorpe, director
- ROBERT deGRANDE, ASC, "The Danny Thomas Show," (Desilu Prods.) with Danny Thomas, Sherry Jackson, Sheldon Leonard, director, "The Brothers," (Desilu Prods.) with Gale Gordon, My Avery, director

- HENRY CROUCHMAN, "Sheen of Corbin," (Desilu Prods.) with John Bromfield, Les Stevens, director

- JOE NOVAK, ASC, "Wise Service," (Desilu Prods. Shooting in Mexico & England) with Dan Clark, Vernon, director

- CHARLES SCHUCHER, "Adventures of Jim Brown," (Desilu Prods.) with Scott Forbes, Lewis Fennel, director

PARAMOUNT

- DANIEL L. FAPP, ASC, "The Joker," (VistaVision) with Frank Sinatra and Jessica Craig, Charles Fido, director
- LOYAL GRIGGS, ASC, "The Tin Star," (VistaVision) with Henry Fonda and Betsy Palmer, Anthony Mann, director

PARADE STUDIOS

- RALPH WIDMAYN, ASC, "Comedian's General Life Insurance Company," (Parade Prods.) Jack McDougall, director

REPUBLIC STUDIOS

- ERIC COLMAN, ASC, "Noah's Ark," (Mark VII Prods.) with Paul Burke, Jack Wahl, director
- RALPH LINDSEY, "Alfred Hitchcock Presents," (H. Dougherty, director)
- VIRGINIA MILES, ASC, "Do You Trust Your Wife," (Don Fedden Prods.) with Edgar Bergen, Jim Hagen, director
- JACK MARTA, "Spoken of the Ferns," (Indurama, Transilva) with Red Canyon and Vera Holman, Joe Kane, producer-director

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• BERN KERNFELDER, "Soldiers of Fortune," (Revue Productions) with John Russell Paul Landers, director; "The Millionaire," (Don Feddersen Productions) Al Green, director; "Home Studio 57," (Revue Productions) with Ralph Bellamy R. Dougherty, director.

• WILLIAM SCHERER, ASC, "The Millionaire," (Don Feddersen Productions) Al Green, director; "On Trial," (Fadyen Inc.) with Joseph Cotton R. Dougherty, director; "Scholar Playhouse of Stars," (Meadow Productions) with Edmund O'Brien, Don Hen, director.

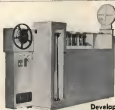
• CLARK KIMBLEY, ASC, "Soldiers of Fortune," (Revue Productions) with John Russell Paul Landers, director; "Crusader," (Revue Productions) Bern Kersh, director; "Nevada State Troopers," with Rod Cameron Richard Irving, director.

• EDNA TRACY, ASC, "Frontier Doctor," (Studio City TV) with Rex Allen, William Watson, director.

• ROBERT PITCHER, ASC, "General Electric Theatre," (Revue Productions) with Gene Garton, John Truitt, director.

• RAY KENNEDY, ASC, "The Millionaire," (Don Feddersen Productions) Harry Warner, director; "On Trial," (Fadyen Inc.) with Jack Lockhart, Harry Warner, director.

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Various directors.

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• WILLIAM SUTHER, ASC, "Backstage in
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• MAURICE HARTMAN, "The Viking,"
(Colorized Prods. shooting in N.Y.) with
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BEO-PAINE

• FRANK REDMAN, ASC, "Boy Jojo,"
(Four Star Prods.) with Jeanne Carmen.
Alfred Jenkins. Lee Goudwin, director.

• GEORGE DEKANT, ASC, "Dick Powell's
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Johnson, producer-director.

• LEON SHANNON, ASC, "The Girl Can't
Help It," (CinemaScope) with Tom Ewell
and Joyce MacFarlane. Frank Tashke, director.

• MILTON KAMNER, ASC, (shooting in
Greens, CinemaScope, Delcolor color), "Boy
Be a Dolphin," with Alan Ladd, Clifton Webb
and Sophia Loren. Jean Negulesco, director.

• FREDERICK YOUNG, ASC, "Island in the
Sky," (CinemaScope & color, shooting in
B.W.I.) with James Mason and Jean
Floreffe. Robert Rossen, director.

• HAROLD LIPSTEIN, ASC, "Conquest,"
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Mexico) with Ray Milland and Debra Paget.
Allen Davis, director.

UNIVERSAL-INTERNATIONAL

• WILLIAM DUNSTON, ASC, "Night Passage,"
(Technicolor) with James Stewart and
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• ELLIS CARTER, ASC, "The Land Unknown,"
(CinemaScope) with Jack Mahoney and
Sharon Stone. Virgil Vogel, director.

• ANDREW ARLING, ASC, "The Man of a
Thousand Faces," (CinemaScope) with Jeff
Chandler, Bruce Wells and Colleen Miller.
Jack Arnold, director.

• IRVING CLARKE, ASC, "Joe Dakota,"
(color) with Jack Mahoney and Larra Pat-
ton. Richard Bartlett, director; "Rory Dalton
commercial," Wil Cowen, director, Ford
commercial; John Sherwood, director,
United States Steel commercial; Wil Cowen,
director.

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with Susan Hayward and Kirk Douglas. H. C.
Foster, director.

• JACK CARROLL, "The Sleeping Partner,"
(LAP Production shooting in London) with
Marilyn Monroe and Laurence Olivier. Lau-
rence Olivier, producer-director.

• HARRY SHANLEY, ASC, & GUYE BANCRA,
ASC, "A Face in the Crowd," (Newcom
Prod. shooting in Arkansas) with Andy G-
fith and Patricia Neal. Elia Kazan, producer-
director.

• WILLIAM CLARKE, "Lafayette Escadrille,"
with Tab Hunter and Errola Chertova.
Wm. Wellman, producer-director.

• RYE FENSTERMAN, ASC, "Lafayette Escad-
rille," (Aerial photography).

• HAROLD STONE, ASC, "Candor," with
Kathleen. John Rush, director.

• TIM MCCOAN, ASC, "Show Out at Melt
Crazy Band," with Randolph Scott and Don
Clyde. Richard L. Best, director.

• NICK MURRAY, ASC, "The Story of Mia
Karl," with Ronald Colman and Charles
Coburn. Irwin Allen, producer-director.

• LINDA LUNDEN, ASC, "The Black Sheep-
er," (shooting in Mexico City) with Rich-
ard Widmark and Merle Coady. Edward Lad-
wig, director.

• EDWIN DUPAY, ASC, "Chrysalis," with
Cliff Walker. Lester Maltzman, director.

GRASSHOPPER GROUP

(Continued From Page 137)

ment and assistance it offers to some of
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tresses. Thanks to the Group's annual
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Stuart Wynn Jones, who has been
quietly working at animated experi-
ments and employing discs and syn-
thetic music, was an unknown name
until his charming interpretation of
"Linden Lea" and his abstract "Oodles
of Bees" were enthusiastically re-
ceived at a Grasshopper show. As a
result he has been encouraged to make
"A Short Spell," a delightful two-minute
trifle drawn direct onto film with a
hand-painted sound track; and he is
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Similarly Grasshoppers have reacted films passed over by judges. "Watch the Birdie," the most popular film shown during their first season, had been practically ignored by adjudicators; yet this brilliantly inventive amateur cartoon in far superior to anything Dabers or the Group have yet produced. Bob Godfrey and Keith Learner, the team behind "Birdie," have since had their work compared to the best of U.F.A. cartoons, and are now producing Biographic Cartoon Films in their own professional studio.

Kevin Brownlow, at eighteen the youngest member of the Grasshoppers, narrowly missed a Yen Best award with "The Capture." But for the Group, the film would have been forgotten. As it is its reception at Gosop screenings has given Brownlow the encouragement to embark on "It Happened Here," which, against the background of an England occupied by Nazis, explores the psychology of a defeated people. With large-scale crowd scenes in central London locations, it is the most ambitious amateur film ever attempted in Britain.

The three films so far produced by the Gosop as a group have attempted little that is really new, despite the pots and applause. "Two's Company" and "Bride and Groom" are mere imitations of McLaren's pinulation technique with-



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out point or purpose. Neither carries exploration of the style much further. "The Battle of Wangpore" is a staggering achievement for an amateur organization, but for all its visual appeal remains a conventional cartoon which might well have come from any commercial studio. In short, the Genshopper Group has hardly begun to experiment.

Of the three Genshopper films currently in production, Wynn Jones's "Pythagoras" and "The Window," a semi-abstract cartoon by Dick Horn, are the most intriguing. "Let Battle

Commence," written and directed by Daborn, tells the story of the marauder effort behind "The Battle of Wangpore."

Already Adventure Films, a new commercial organization, has found ready markets for productions by units and members of the Group all over the world. The opportunities which Genshoppers thus offer to isolated talents, the chances of financial and technical aid which they afford lone workers, and the stimulus which they provide may yet make this Group the most important development in British amateur movie making.

Tricks Make Titles Interesting

Innovations any cine filmer can employ to add class to his movie titles.

By JOHN FORBES

A GOOD beginning is half the battle in interesting an audience in your picture—and an eye-arresting main title is one of the best ways of getting your picture off to a good start. Here are a few simple camera tricks that will help life your titles out of the run-of-the-mill class.

In professional movies you've seen titles apparently melt into a fondness smear, haven't you? Well, here's an easy way to duplicate the trick for your home movie titles. Begin by making a transparency of your title with a still-camera, using any good, double-coated glass plate (not roll or cut film) like the "Standard Orthoscan." For a plain title, simply copy a hand-lettered or type-written title written in black on a white card; the developed plate, being a negative, will give you white letters on a black field. For an "art" title, you can double-expose your transparency, copying the background from a suitable still negative. If your movies are in color, use your plate with any of the commercially-available tints which will color the emulsion blue, red, green or sepia, and leave the clear letters uncolored.

Now put this into a simple shadow-box attached your title so that all the illumination on the transparency comes from behind. Line up the title-plate and camera just as you would in shooting any ordinary title.

Now, here's where we come to the trick in making the transparency, expose and develop the plate as usual, but when you fix it, fix it in plain hypos—that is, with no busdenier in the solu-

tion. This leaves the emulsion soft. Wash the plate as usual, but only dry it enough to get the surface moisture out.

When you've exposed sufficient footage of your title, heat the plate with an electric heater or blowtorch just outside the camera's field, and as close to the plate as you can get it. The heat will melt the soft emulsion causing it to flow, and the title will disintegrate into a formless blob. Sometimes, depending on the means used for heating the plate, you may find it necessary to have the camera running below normal speed—even to shoot in stop-motion, sometimes—to speed up the "melting" effect.

If you mount the plate upside down while you shoot this trick, you can make the title "melt" in; and by making two identical title-plates, you can make your title melt itself in and out, following the "upside down" procedure.

Another shadow-box trick you can do when shooting titles for color films is to use a black card with letters cut out and illuminated only from behind. You can make the letters any color you want by putting colored cellophane behind them.

For example, put colored cellophane sheets behind the letters, arranged in

CORRECTION

In the Hollywood Camera Company advertisement, which appeared on page 484 of our November issue, the following statement was inadvertently omitted from the text: "Equipment is All-Purpose means that it used good cameras." The advertisement appears also in this issue.—ED

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log-rabin style and in rows of alternate colors. Lit from behind, you'll get a really remarkable effect. And, of course, you can double-expose any picture you want against the black field of this title, and you'll get the effect of multicolored letters superimposed on the picture.

On the other hand, you can eliminate the black field and cut-out letters, and make your whole title of the backlit cellophane straws, preferably with the straws close together, running horizontally across the frame. Paint your lettering on the straws so that the letters will show up as black silhouettes against the luminous, colored background.

Now, suppose you want these letters to animate in or out. If you want them to animate in, point the letters, and then as soon as the paint has dried, rotate the straws so that the portion of the letters painted on each straw is on the upper surface of the straw, and thus hidden from the camera. Shoot a few inches of the colored background this way. Then stop the camera and rotate the top row of the straws which have been lettered so that their painted surfaces are toward the camera. Shoot a few frames of this, and then rotate the next lower row, and so on, until all your lettering has been animated in. Then, of course, you can run off the necessary footage of the title, after which you can

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use the same track to animate the title-lettering out.

On the screen the effect will be that of the letters "wiping" themselves in and out. Naturally, you can make the wipe move up or down as you wish, and by putting the steams in vertically or at a slanted angle, you can make the wipe move horizontally or diagonally. Another trick you can use is this: take a ball and cover it with a thin coating of either plasticine or shellac. While surface is still tacky, stick it with small fragments of a broken mirror. Then hang this glistening multi-faceted ball behind the cellophane-stem curtain. Focus a spotlight on it so that the light reflects from the ball to the cellophane curtain in the title's shadow-box. If you revolve the ball slowly while you shoot, innumerable little points of light will shimmer across the title, changing color as they move from one colored straw to the next.

A variation of this is to reflect the light from a small drum-type box faced with strips of mirror. There are packages of body-powder and bath-salts for sale in drugstores in packages like this. You could give one to your wife—and then beg the box from her for this titling trick!

If you have access to a theatrical-supply store, you can get some of the multi-colored gelatin sheets used for colored-light effects in theatre spotlights. It's known as Brigham's gelatin, and comes in a variety of colors. One type, I believe, has a sort of rainbow-striped effect and is available in several colors. Other types have mottled effects in different color-combinations. The pattern known as No. 80 is a splashy mixture of green and yellow, No. 85 is a mixture of green, red and clear gelatin. The No. 90, purple, green and clear, and No. 95, red, yellow, green, blue and clear. This material costs only a few cents a sheet, and by using it either directly behind your cut-out title-letters, or in front of a spotlight for frothing titles, you can get some very interesting effects. You'll add novelty to them if you keep the gelatin moving so that the color patterns also move.

The possibilities of three-dimensional track titles are almost endless. These

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really run into what the still-photo enthusiasts call "table-top" photography, for what you do is build a miniature set around the lettering of your title. You can make the set as simple or as elaborate as you want.

One clever one observed in a recent amateur picture devoted to a child's Christmas consisted of a simple, inverted background—probably made of hooks or something like that—with colored cloth or tissue-paper over them. The letters—the familiar, wooden cut-out block letters—were arranged on the "steps" of this terraced stage. At the sides of the frame were two or three

small toys—just enough to give the right atmosphere. The same title-slide was repeated for the end-title. And in this, a small mechanical device was wound up and bruzzed waggled its tail at the camera, while it shimmied over toward the center of the frame!

"Table-top" titles like this afford lots of opportunities to play around with lighting. You can experiment with back-lighted and cross-lighted effects to your heart's content. Make generous use of spotlights in this, and by using colored gelatins on the spotlights, you can get all sorts of fascinating color combinations.

IT'S DONE WITH MIRRORS

(Continued From Page 729)

effect superimpositions will require slight increase in exposure due to the inherent light absorption of the mirror. How much can be determined by making a short test film.

When the second mirror (which has been cut in size so as to reflect only the bottom half of the image from mirror "B") is moved into position, the effect of splitting the screen horizontally using the upper portion of scene #1 and the lower portion of scene #2 results. This mirror may be either a single-surfaced

mirror or a two-way mirror depending upon the effect desired.

With these two mirrors alone it is possible to produce vertical split screen shots in any proportion, horizontal split screen effects, mix live announcers with camera cards or displays or use semi-automated "operating cut-outs" (making the movements from behind the art work during the filming). Changing from one set to the other is done smoothly without stopping the camera.

Other mirrors may be made up to

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give numerous varied effects. By having a $\frac{3}{16}$ " plate glass, silvered with a circle, diamond or rectangle in the center it is possible to combine the two scenes using only the center of one scene and the surrounding area of the other. This effect is accomplished easily by first moving the full mirror into position in front of the lens, then moving the special effects mirror into position behind it.

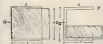


FIG. 5—REVERSAL mirror units are made of $\frac{1}{16}$ " sheet brass, are 2"x3 $\frac{1}{2}$ " in size

When the first mirror is moved out it will wipe on the surrounding scene directly in view of the lens, leaving the reflected scene only in the center.

In using this mirror unit only a few rehearsals are required for timing and effecting the changes of scenes previous to filming. Where the audio has been pre-recorded on magnetic tape and is being recorded directly onto the film, one can hear the narration and easily time the change to match the story book. This works equally as well with on-the-spot recording.

A feature of this method is that picture fidelity is improved by the elimination of the usual transfer steps required for dupe negative and release print. The reversal film right out of your camera is the finished commercial. The process takes no more time than that required to duplicate a similar production live using two TV cameras.



FIG. 6—Mirror unit "A", showing dimensions of unit designed to accept field of Fox-Clear 17mm/70mm zoom lens.

Mirror Unit "A" (1 in Fig. 2; also Figs. 5 and 6, above) is made of quality steel. Bottom and top rails are $\frac{1}{8}$ " by $\frac{3}{8}$ " steel bars 6" long. Slots $\frac{1}{16}$ " by $\frac{1}{8}$ " are machined the full length in order that the brass mirror mounts may be removed. Rails are held securely in alignment by $\frac{1}{8}$ " steel pins $25\frac{1}{2}$ " wide drilled and tapped into rails. Block on bottom rail is drilled to accept $\frac{3}{8}$ " bolt for mounting to main mounting plate (4), with lock nuts for adjusting height of this unit to lens.

The movable mirror matrix are made of $\frac{1}{16}$ " sheet brass 3" by $3\frac{1}{4}$ " and the mirrors secured in them with glass glue or model cement. For the half-mirror and two-way mirror a three-sided frame is used, leaving the right side free of obstruction to the direct field of the lens.

Mirror unit "B" (2 in Fig. 2; also Fig. 7, below) is made of $\frac{1}{16}$ " sheet brass 5" by 6" with brass bearings welded top and bottom and $\frac{3}{8}$ " shaft, threaded top and bottom. A coil spring on top secured by lock nut permits variable tension to allow easy movement without vibration. This unit, like Unit "A", is mounted on the $\frac{1}{8}$ " sheet steel base (4) and the mirror is secured to it by brackets or model glue.

To give the reader an idea what the device can do for him, it is suggested that he make a mock-up of this equip-



FIG. 7—Mirror unit "B" made of $\frac{1}{16}$ " sheet brass, is 5"x6" in size, pivots on spring-mounted bolt. Mirror is front-surfaced

ment, using any mirrors that may be handy, to see the effect that can be produced, then proceed with the machining of the unit to fit his particular camera equipment.

Do not attempt to use anything but front-surfaced mirrors of the best quality available. The use of regular plate glass (back surface) mirrors will produce a double image from surface reflections and will cause color aberration that cannot be corrected.

Any glass company equipped to silver mirrors can front-surface $\frac{1}{8}$ " plate glass, which will prove quite satisfactory for the most critical cinematography. Two-way mirrors are generally available from the W. P. Faller Co.

Using this mirror unit it is possible to deliver to clients smart, effective commercial spots, or composite sound-on-film commercials in a matter of hours instead of days and weeks. The savings to the producer in time is fantastic, for there is no editing, syncing or printing.

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To expand its basic research in solid state and chemical physics, National Carbon Company has recently enlarged its staff of scientists and provided them with an ideal laboratory setup for creative work.



Studying color balances for better color movies

The spectrometer analyzes the complete "rainbow" of colors in projected light — to give an investigator, in one and a half minutes, information that he formerly worked half a day to get. Research like this helped National Carbon Company win the coveted "Oscar" this year for developing lighting carbons which were balanced to operate with other studio lights.

New "particle" theory promises help in developing still brighter carbon arcs

Although the high-intensity arc has been around for forty years now, nobody has yet been able to explain satisfactorily how it produces the super-bright light so useful for movie projection and studio lighting.

At one time it was thought that the brilliant light came from atomic reactions taking place within the glowing crater or pit at the tip of the positive electrode where the energy of the arc is highly concentrated. But this theory has been radically modified by researchers at National Carbon's laboratories.

Now it is believed that a much more complicated process takes place in the crater region where powerful electrical currents heat the carbon to temperatures of 10,000 to 12,000 degrees Fahrenheit,

roughly the temperature of the sun's surface. According to the new "particle" theory, material from the molten floor of the crater vaporizes into tiny particles of the order of a millionth of an inch in diameter. These white-hot liquid droplets stream out into the space between the carbon electrodes of the arc to form a long, luminous tail flame or "comet tail."

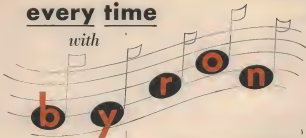
Precise knowledge of this process, combined with results of other experiments now under way at the Parma laboratories, should point the way toward new, brighter lighting carbons that will stand up to higher and higher currents and temperatures. More details of the work at Parma are given in a new booklet titled "Research." Write for a copy.

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